Cerebral Arteriovenous Malformation Draining Vein Stenosis is Associated with Atherosclerotic Risk Factors.

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Introduction

The pathogenesis of venous intimal hyperplasia and venous outflow stenosis associated with cerebral arteriovenous malformation (AVM) draining veins is poorly understood. We sought to determine the relationship between venous stenosis and atherosclerotic risk factors.

Methods

All patients with an AVM seen at our institution between 1990-2016 were retrospectively reviewed (n=300). Patients < 18 years were excluded (n=22). Patients were classified into two groups based on presence or absence of venous stenosis. Patient charts were reviewed for the following atherosclerotic risk factors: age (male > 45 years, female > 55 years), sex, race, hypertension, type 2 diabetes mellitus, hyperlipidemia, coronary artery disease, chronic kidney disease stage III, cigarette smoking. Relationship between venous stenosis and atherosclerotic risk factors was assessed using the chi-square test.

Results

278 patients were included (mean age = 41 years, 54% male). Venous stenosis was present in 87 patients (31% of cohort). Presence of venous stenosis was significantly associated with hypertension (P=0.03), diabetes (P=0.01), and hyperlipidemia (Table). Venous stenosis also tended to be associated with age (P=0.06).

Conclusions

Venous stenosis is associated with several atherosclerotic risk factors, suggesting that venous stenosis occurs by the same process that leads to intimal hyperplasia. Moreover, these modifiable risk factors may be targeted to prevent cerebral AVM venous outflow stenosis and hemorrhage.

Learning Objectives

By the conclusion of this session, participants should be able to:

1) Discuss the pathogenesis of venous outflow stenosis associated with cerebral AVM draining veins

2) Identify patients at risk for development of venous stenosis

3) Identify modifiable risk factors that can be controlled to prevent AVM venous outflow stenosis

Table

Atherosclerotic Risk Factor	X^2 Statistic	*P* value
Age (M>45 or F>55)	2.10	0.06
Age (M>45)	2.43	0.08
Age (F>55)	0.35	0.36
Male sex	0.29	0.34
Black race	0.75	0.24
Hypertension	3.99	*0.03
Type 2 diabetes	6.71	*0.01
Hyperlipidemia	11.08	*0.002
Coronary artery disease	0.08	0.47
CKD Stage III	0.11	0.47
Smoking	1.68	0.12

Association between atherosclerotic risk factors and AVM venous stenosis